

What is claimed:

1. A positive photoresist composition comprising a photoactive component and a polymer that comprises 1) groups crosslinked or reactive to crosslinking; and 2) non-aromatic photoacid-labile groups, with at least a portion of the groups 1) crosslinked to other polymer units.
2. The photoresist of claim 1 wherein the polymer comprises phenolic units.
3. The photoresist of claim 2 wherein at least a portion of phenolic units are covalently linked to other phenolic units, either of the same polymer chain or of a separate polymer chain.
4. The photoresist of claim 1 wherein the polymer comprises acrylate photoacid labile groups.
5. The photoresist of claim 1 wherein the photoacid labile groups comprise acrylate esters that comprises a tertiary non-cyclic alkyl group or a secondary or tertiary alicyclic group.
6. The photoresist of claim 5 wherein the photoacid acrylate esters comprise tert-butyl, adamantyl, or norbornyl groups.
7. The photoresist of claim 1 wherein the polymer comprises 1) phenolic units, at least of portion of which in crosslinked form; 2) photoacid labile groups; 3) groups that are unreactive to lithographic processing conditions.
8. The photoresist of claim 7 wherein groups 3) are nitrile groups, optionally substituted phenyl groups, or optionally substituted alicyclic groups.

9. The photoresist of claim 1 wherein the polymer is substantially free of aromatic groups.

10. The photoresist of claim 1 wherein polymer units are crosslinked by a separate crosslinker component.

11. The photoresist of claim 10 wherein prior to reaction with the polymer the crosslinker component is an unsaturated compound.

12. The photoresist of claim 10 wherein prior to reaction with the polymer the crosslinker component is a vinyl ether.

13. The photoresist of claim 10 wherein prior to reaction with the polymer the crosslinker component is a divinyl ether.

14. The photoresist of claim 10 wherein prior to reaction with the polymer the crosslinker component is 1,4-butanedivinyl ether, 1,6-hexanedivinyl ether, 1,4-cyclohexane dimethanoldivinyl ether or bis-vinylether-ethane ether.

15. A method for forming a photoresist relief image, comprising:
  - a) applying a layer of a photoresist composition of claim 1 on a substrate; and
  - b) exposing and developing the photoresist layer on the substrate to yield a photoresist relief image.

16. The method of claim 17 wherein the substrate is a microelectronic wafer or a flat panel display substrate.

17. The method of claim 17 wherein the photoresist layer is exposed to patterned radiation having a wavelength of about 248 nm.

18. The method of claim 17 wherein the photoresist layer is exposed to patterned radiation having a wavelength of less than 200 nm.

19. A method for preparing a photoresist composition, comprising

a) admixing 1) a crosslinker component and 2) a polymer that comprises i) groups reactive to cross-linking; and ii) non-aromatic photoacid-labile groups, to provide a crosslinked polymer; and

b) adding a photoactive component to the crosslinked polymer to provide a photoresist composition.

20. The method of claim 21 wherein the photoresist composition is prepared without isolation of the crosslinked polymer in a).

21. An article of manufacture comprising a substrate having coated thereon a photoresist composition of claim 1.

22. An article of claim 22 wherein the substrate is a microelectronic wafer or a flat panel display substrate

23. A polymer that comprises 1) groups crosslinked or reactive to cross-linking; and 2) non-aromatic photoacid-labile groups, with at least a portion of the groups 1) crosslinked to other polymer units.

24. The polymer of claim 25 wherein the polymer comprises phenolic units and acrylate acid labile units.

25. The polymer of claim 25 wherein the polymer is a terpolymer that comprises 1) phenolic units, at least of portion of which in crosslinked form; 2) non-aromatic photoacid labile groups; 3) groups that are unreactive to lithographic processing conditions.